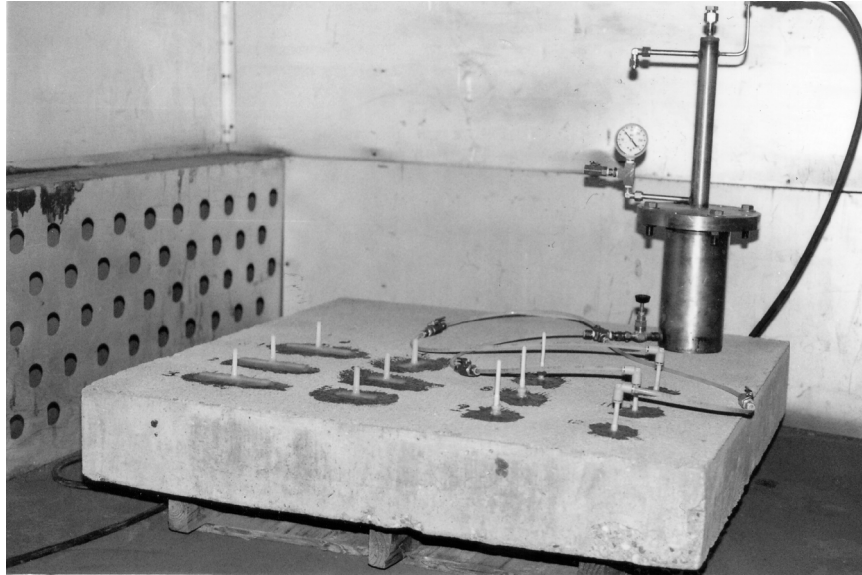




## REMR TECHNICAL NOTE CS-MR-3.12

### HYDROSTATIC TESTS OF INJECTION PORTS USED FOR IN SITU REPAIR OF CONCRETE



Hydrostatic test setup used to test injection ports

**PURPOSE:** To report the results of hydrostatic testing of selected injection port configurations by Brookhaven National Laboratory under contract to the US Army Corps of Engineers,

**APPLICATION:** Pressure injection of epoxy is an effective repair method for air-dried and water-saturated cracks in mass concrete hydraulic structures. Injection ports are attached to the structure prior to concrete repair,

**DESCRIPTION:** Tests were conducted to evaluate the physical integrity of three types of molded polyethylene ports and the methods used to attach the ports to concrete. Two of the ports obtained from Dural International, Inc. were designed for surface mounting; the third, designed for surface mounting or insertion into a drilled port hole, was obtained from Lily Corporation. The ports were bonded to the concrete with a quick-setting adhesive and then sealed with epoxy. The epoxy was fully cured before pressure injection was begun. Each set of ports was hydrostatically tested simultaneously at each pressure level for 15 min. Results are summarized in the table below.

In general, all of the failures were the result of leaks developing around the perimeter of the injection port and propagating through the interface between the epoxy seal coat and the injection port. This leakage was primarily due to the inability of the epoxy to securely bond to the polyethylene. In no instance did any of the injection ports physically fail. The results indicate that ports mechanically mounted in a drilled port hole will withstand higher

Results of Hydrostatic Testing of Injection Port Configurations

| Type of<br>Injection Port                   | Port<br>No. | Contact surface<br>area, cm <sup>2</sup> | Test pressure, psig |      |     |     |     |     |  |
|---|-------------|--|---------------------|------|-----|-----|-----|-----|--|
|   |             |  | 50                  | 100  | 150 | 200 | 250 | 275 |  |
| Type A, surface<br>mounted.                 | 1           | 5.3                                      | P*                  | SF** |     |     |     |     |  |
|   | 2           |  | P                   | SF   |     |     |     |     |  |
|   | 3           |  | P                   | SF   |     |     |     |     |  |
| Type B. surface<br>mounted.                 | 4           | 9.1                                      | SF                  |      |     |     |     |     |  |
|   | 5           |  | SF                  |      |     |     |     |     |  |
|   | 6           |  | P                   | SF   |     |     |     |     |  |
| Injecti-port,<br>surface mounted.           | 7           | 0.8                                      | P                   | P    | P   | SF  |     |     |  |
|   | 8           |  | P                   | P    | P   | SF  |     |     |  |
|   | 9           |  | P                   | P    | P   | SF  |     |     |  |
| Injecti-port<br>inserted into<br>port hole. | 10          | --                                       | P                   | P    | P   | P   | SF  |     |  |
|   | 11          | --                                       | P                   | P    | P   | P   | P   | P   |  |
|   | 12          | --                                       | p                   | p    | p   | p   | SF  |     |  |

\* P = passed.

\*\* SF = seal coat failure.

injection pressures than surface-mounted ports. The results also indicate that the ability of a surface-mounted port to withstand injection pressures is related to the surface area of the port in contact with the concrete, with ports having a larger surface area being able to withstand the least amount of pressure,

REFERENCE: Webster, R. P., Kukacka, L. E., and Elling, D. (in publication). "In Situ Repair of Deteriorated Concrete in Hydraulic Structures: Epoxy Injection Repair of a Bridge Pier," Brookhaven National Laboratory, Long Island, NY.